**Purpose:**

To describe the procedure used to validate timers and stopwatches used in TSL. Validation must be verified annually using Direct Comparison Methodology.

**Required Materials:**

* Timer or stopwatch to be validated
* Land line phone with speakerphone capabilities
* Long Distance Calling code
* Tempchek, TempTrak or means to monitor room temperature

**Limitations and Precautions:**

* Operators start/stop reaction time may vary and is considered a significant part of the total uncertainty.
* Length of phone call to traceable audio time source is limited to 3 minutes
* Telephone signal delays when using land lines can be up to 30 ms due to phone calls being routed through circuits. Calls to a NIST laboratory outside the continental US are routed through a communications satellite. It is recommended to use the same NIST laboratory for both the start and stop tones.

**Procedure:**

|  |  |  |
| --- | --- | --- |
| **Step** | **Action** | **Related Documents** |
| 1 | Align timers near the phone   * Clear the saved time on the channel (1, 2, or 3) you will be using * Press the channel number to test it is ready. It should be counting up and flashing “time’s up” |  |
| 2 | Call the closest continental traceable audio time source:   * NIST Laboratory in Ft Collins CO   (303) 499-7111   * United States Naval Observatory in Colorado Springs CO   (719) 567-6742 |  |
| 3 | A series of tones will be heard approximately every second.   * A voice will announce the time at the beginning of the next minute, which will begin about 7.5 seconds after announcement. * Start the timer on the high pitched beep * If doing more than one timer at a time, have a second person help. |  |
| **Step** | **Action** | **Related**  **Documents** |
| 4 | Document on a piece of paper the time you started the timer.   * Each phone call is limited to 3 minutes |  |
| 5 | Call the same number and wait for the voice announcing the time   * Stop the timer on the high pitched beep after the voice announcement and document the time * The difference between the times should match the time shown on the timer * These should match to 0.001% accuracy * If they are not an exact match, repeat the testing |  |
| 6 | Collect data on three different start/stop intervals   * 2 minutes * 15 minutes * 5 hours |  |
| 7 | Document data | Digital Timer Validation Form |
| 8 | Place a sticker on the back of the timer or stopwatch. Include   * date of validation * Tech ID * date validation is due |  |

References

NIST Recommended Practice Guide: Stopwatch and Timer Calibrations, Special Publication 960-12 May 2004.